SUMMARY OF THE INVENTION

[0028] It is a general object of the present invention to provide a coordinate input and detection device and an information display and input apparatus in which the above-described disadvantages are eliminated.

[0029] A more specific object of the present invention is to provide a coordinate input and detection device which makes each of sector-shaped light beams projected over the surface of a touch panel as thin as possible in a direction perpendicular to the surface of the touch panel so that a wrong detection based on an unnecessary interruption of each light beam other than an indication by means of a finger or an indication pen is prevented from being caused and that the detection accuracy of the coordinate value of a light beam interruption position is increased, and adjusts each light beam made incident on each light receiving surface so that each light beam is distributed uniformly in a spreading direction thereof parallel to the surface of the touch panel also for the purpose of increasing the detection accuracy.

[0030] It is another more specific object of the present invention to provide an information display and input apparatus including such a coordinate input and detection device.

[0031] The above objects of the present invention are achieved by a coordinate input and detection device including: a touch panel including a surface; a plurality of light emitting units projecting light beams traveling parallel to the surface of the touch panel over a predetermined region of the touch panel, each of the light beams being a parallel beam having a uniform thickness in a direction perpendicular to the surface of the touch panel and having a sector shape in a direction parallel to the surface of the touch panel; a reflective member provided on a peripheral portion of the touch panel to reflect the light beams toward first optical paths through which the respective light beams travel to reach the reflective member; a plurality of intensity distribution detection units receiving the respective light beams reflected by the reflective member to detect intensity distributions of the light beams; a coordinate detection unit detecting a coordinate value of a position where the light beams are interrupted based on the intensity distributions; and a plurality of filters disposed in respective second optical paths in directions perpendicular to directions in which the respective lights beams travel, the second optical paths being optical paths through which the respective light beams reflected by the reflective member travel to reach the respective intensity distribution detection units, the filters having transmission rates varying with respect to positions within the filters.

[0032] According to the above-described coordinate input and detection device, the distribution of the amount of light of each light beam can be adjusted to have an optimum characteristic by varying the transmission rate of each filter along a longitudinal length thereof even though a thickness of each light beam passing through each filter is thin.

[0033] Therefore, a wrong detection based on an unnecessary interruption of each light beam other than an indication by means of a finger or an indication pen or based on non-uniformity of the distribution of amount of light is prevented from being caused, and an input position detection with higher accuracy and increased reliability can be performed.

[0034] The above objects of the present invention are also achieved by an information display and input apparatus including an information display unit including a display for displaying a variety of information, and a coordinate input and detection device, which device includes: a touch panel including a surface, the touch panel serving as the display of the information display unit; a plurality of light emitting units projecting light beams traveling parallel to the surface of the touch panel over a predetermined region of the touch panel, each of the light beams being a parallel beam having a uniform thickness in a direction perpendicular to the surface of the touch panel and having a sector shape in a direction parallel to the surface of the touch panel; a reflective member provided on a peripheral portion of the touch panel to reflect the light beams toward first optical paths through which the respective light beams travel to reach the reflective member; a plurality of intensity distribution detection units receiving the respective light beams reflected by the reflective member to detect intensity distributions of the light beams; a coordinate detection unit detecting a coordinate value of a position where the light beams are interrupted based on the intensity distributions; and a plurality of filters disposed in respective second optical paths in directions perpendicular to directions in which the respective lights beams travel, the second optical paths being optical paths -through which the respective light beams reflected by the reflective member travel to reach the respective intensity distribution detection units, the filters having transmission rates varying with respect to positions within the filters.

[0035] The above objects of the present invention are further achieved by an information display and input apparatus including an information display unit including a display for displaying a variety of information, and a coordinate input and detection device, which device includes: a touch panel including a surface, the touch panel being made of a transparent material and placed on the display of the information display unit; a plurality of light emitting units projecting light beams traveling parallel to the surface of the touch panel over a predetermined region of the touch panel, each of the light beams being a parallel beam having a uniform thickness in a direction perpendicular to the surface of the touch panel and having a sector shape in a direction parallel to the surface of the touch panel; a reflective member provided on a peripheral portion of the touch panel to reflect the light beams toward first optical paths through which the respective light beams travel to reach the reflective member; a plurality of intensity distribution detection units receiving the respective light beams reflected by the reflective member to detect intensity distributions of the light beams; a coordinate detection unit detecting a coordinate value of a position where the light beams are interrupted based on the intensity distributions; and a plurality of filters disposed in respective second optical paths in directions perpendicular to directions in which the respective lights beams travel, the second optical paths being optical paths through which the respective light beams reflected by the reflective member travel to reach the respective intensity distribution detection units, the filters having transmission rates varying with respect to positions within the filters.

[0036] According to the above-described information display and input apparatuses, the same effects as those of the above-described coordinate input and detection device can be obtained.